CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method comprising:

administering a composition comprising at least one ligand for a pattern recognition receptor rmolecule and a delivery vehicle to a subject.

2. The method of claim 1, wherein a ligand for a pattern recognition receptor comprises a ligand for a signaling pattern recognition receptor.

3. The method of claim 2, wherein said signaling pattern recognition receptor comprises at least one receptor selected from the group consisting of Toll-like receptors TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-10, TLR-11 and TLR-12 and mannan-binding lectins, and macrophage mannose receptor and scavenger receptors.

4. The method of claim 3, wherein said ligand comprises a ligand for TLR-2, TLR-3 and/or TLR-9.

5. The method of claim 1, wherein a ligand for a pattern recognition receptor comprises a ligand for an endocytic pattern recognition receptor or scavenger receptor or mannose-binding receptor.

6. The method of claim 1, further comprising modulating an immune response in said subject.

7. The method of claim 6, wherein modulating an immune response comprises augmenting an immune response.

8. The method of claim 6, wherein modulating an immune response comprises down regulating an immune response.

9. The method of claim 6, wherein modulating an immune response comprises augmenting an immune response in a subject disposed of cancer.

10. The method of claim 9, wherein cancer comprises one or more selected from the group consisting of lung cancer, skin cancer, liver cancer, bone marrow cancer, leukemia, ovarian cancer, breast cancer, prostate cancer, colon cancer, lymphoma, brain cancer, renal cell cancer, and cancers of mesenchymal tissues

11. The method of claim 6, wherein modulating an immune response comprises augmenting an immune response in a subject disposed of an infectious disease.

12. The method of claim 11, wherein said infectious disease is caused by one or more organisms selected from the group consisting of a viral pathogen, a fungal pathogen, a bacterial pathogen, a rickettsial pathogen, a parasitic pathogen and a prion pathogen.

13. The method of claim 6, wherein modulating an immune response comprises augmenting or suppressing an immune response in a subject disposed of an allergic disease.

14. The method of claim 13, wherein said allergic disease is caused by an abnormal immune response against an endogenous non-self antigen.

15. The method of claim 14, wherein said non-self antigens comprise at least one of the group consisting of inhaled allergens, cutaneous allergens and oral allergens.

16. The method of claim 6, wherein modulating an immune response comprises modulating an immune response in a subject disposed of an autoimmune disease.

17. The method of claim 16, wherein said autoimmune disease is caused by an abnormal immune response against self antigens.

18. The method of claim 17, wherein the abnormal immune response against self antigens is caused by at least one antigen from the group consisting of antigens derived from the nervous system, antigens derived from the joints, antigens derived from the blood elements, antigens derived from the kidneys, and antigens derived from the eyes.

19. The method of claim 6, wherein modulating an immune response comprises modulating an immune response in a subject disposed of a disease due to abnormal production of proteins in the body.

20. The method of claim 16, wherein said autoimmune disease is caused by an abnormal production of proteins.

21. The method of claim 20, wherein the abnormal production of proteins comprises proteins selected from the group consisting of abnormal proteins in the brain, abnormal proteins of the kidneys, and abnormal proteins of the joints.

22. The method of claim 21, wherein the abnormal proteins of the brain includes abnormal protein of the brain or blood as in the case of in Alzheimer's disease.

23. The method of claim 1, wherein said administration comprises administration by at least one route selected from the group consisting of intravenously, intraperitoneally, by inhalation, subcutaneously, intradermally, intranodally, intramuscularly, intranasally, orally, rectally, intravaginally, intravesicularly, intraocularly, and topically.

24. A method comprising:
administering an agent capable of inducing an immune response against a specific cell type wherein said agent is capable of inducing an immune response against that cell type and inhibiting the normal or abnormal function of that cell type.

25. The method of claim 24, wherein said specific cell type comprises an endothelial cell for the purpose of inhibition of angiogenesis.

26. A method comprising:
administering at least one pattern recognition receptor ligand
and a delivery vehicle capable of stimulating angiogenesis and/or fibrogenesis and/or osteogenesis.

27. The method of claim 26, wherein the pattern recognition receptor ligand is complexed to the delivery vehicle.

28. The method of claim 26, wherein the pattern recognition receptor is selected from the group consisting of TLR ligands, and other pattern recognition receptors.

29. The method of claim 26, further comprising treating a subject with a wound, a bone defect or a fracture.

30. The method of claim 29, wherein the wound comprises a wound or a defect in skin or soft tissues.

31. A composition comprising:

a ligand for the pattern recognition molecule family of receptors; and

a delivery vehicle wherein said composition is capable of inducing an immune response in a subject.

32. The composition of claim 31, wherein inducing an immune response comprises inducing an innate immune response.

33. The composition of claim 32, wherein the innate immune response comprises an innate immune response by macrophages, neutrophils, NK cells, and/or dendritic cells.

34. The composition of claim 31, wherein the delivery vehicle comprises a liposome.

35. The composition of claim 34, wherein the ratio of liposome to ligand comprises about 1:1 to about 100:1mmol liposome to mg ligand.

36. The composition of claim 34, wherein said ratio of liposomes to ligand is about 16:1 or about 8:1mmol liposome to mg ligand.

37. The composition of claim 34, wherein said liposome comprises at least one liposome selected from the group consisting of a positively charged liposome; a negatively charged liposome; and a neutral liposome.

38. The composition of claim 31, wherein said delivery vehicle comprises any combination of liposomes.

39. The composition of claim 37, wherein said positively charged liposome is complexed to a ligand for the pattern recognition molecule family of receptors.

40. The composition of claim 34, wherein said liposome consists of a mixture of charged and neutral lipids of DOTIM (1-(2-(oleoyloxy)ethyl)-2-oleyl-3-(2-hydroxyethyl)imidazolinium) and cholesterol in a 1:1 molar ratio.

41. The composition of claim 31, wherein the delivery vehicle is non-liposomal.

42. The composition of claim 30, wherein the non-liposomal delivery vehicle comprises at least one vehicle selected from the group consisting of polypeptides, polyamines, chitosan, PEI, polyglutamic acid, protamine sulfate, and microspheres.

43. The composition of claim 34, wherein said ligand comprises a TLR ligand.

44. The composition of claim 43, wherein the TLR ligand comprises any portion of a bacterium.

45. The composition of claim 44, wherein any portion of a bacterium further comprises any portion of a bacterium that associates with a TLR.

46. The composition of claim 45, wherein said TLR ligand comprises any portion of a a bacterium that associates with at least one of the following consisting of TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-10, TLR-11 and TLR-12.

47. The composition of claim 43, wherein the TLR ligand comprises any portion of a fungal organism.

48. The composition of claim 47, wherein said TLR ligand comprises any portion a fungal organism that associates with a TLR.

49. The composition of claim 37, wherein said any portion of a fungal organism further comprises any portion of yeast that associates with at least one receptor selected from the group consisting of TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-10, TLR-11 and TLR-12.

50. The composition of claim 43, wherein the TLR ligand comprises any portion of a multicellular organism.

51. The composition of claim 43, wherein the TLR ligand comprises any portion of a unicellular organism.

52. The composition of claim 31, wherein said ligand comprises at least one of the following consisting of a glycoprotein, lipoprotein, glycolipid, carbohydrate, lipid, nucleic acid and/or protein or peptide sequence derived from any portion of a bacterial pathogen.

53. The composition of claim 52, further comprising any portion of a bacterial pathogen that binds at least one receptor selected from the group consisting of TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-10, TLR-11 and TLR-12.

54. The composition of claim 31, wherein said ligand comprises at least one ligand selected from the group consisting of a glycoprotein, lipoprotein, glycolipid, carbohydrate, lipid, nucleic acid and and/or protein or peptide sequence derived from any portion of said fungal organism that associates with one or more selected from the group consisting of TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-10, TLR-11 and TLR-12.

55. The composition of claim 31, wherein said ligand comprises a glycoprotein, lipoprotein, glycolipid, carbohydrate, lipid, nucleic acid and/or protein or peptide sequence derived from any portion of a fungal organism.

56. The composition of claim 31, wherein the ligand comprises a glycoprotein, lipoprotein, glycolipid, carbohydrate, lipid, nucleic acid and and/or protein or peptide sequence derived from any portion of a viral organism.

57. The composition of claim 31, wherein the ligand comprises a glycoprotein, lipoprotein, glycolipid, carbohydrate, lipid, nucleic acid and and/or protein or peptide sequence derived from any portion of a rickettsial organism.

58. The composition of claim 31, wherein the ligand comprises a glycoprotein, lipoprotein, glycolipid, carbohydrate, lipid, nucleic acid and and/or protein or peptide sequence derived from any portion of a parasitic organism.

59. The composition of claim 31, wherein the ligand comprises a glycoprotein, lipoprotein, glycolipid, carbohydrate, lipid, nucleic acid and and/or protein or peptide sequence derived from any portion of an arthropod organism.

60. The composition of claim 31, wherein said ligand comprises a nucleic acid encoding a TLR ligand.

61. The composition of claim 60, wherein said nucleic acid comprises at least one molecule selected from the group consisting of bacterial DNA, eukaryotic DNA, dsDNA, ssDNA a synthetic oligonucleotide, RNA, and synthetic RNA.

62. The composition of claim 61, wherein said oligonucleotide comprises at least one of poly I:C or related poly I:C oligonucleotides.

63. The composition of claim 31, wherein said ligand is a mixture of two or more different TLR ligands in ratios sufficient for eliciting an immune response.

64. The composition of claim 31, wherein said ligand consists of any molecule that associates with and/or stimulates a pattern recognition receptor.

65. The composition of claim 31, wherein said ligand comprises a synthetically generated ligand that binds to and stimulates a pattern recognition receptor.

66. The composition of claim 31, further comprising any molecule with a steroid backbone.

67. The composition of claim 60, further comprising a DNA condensing agent.

68. The composition of claim 67, wherein the DNA condensing agent is polyethylenimine (PEI).

69. A composition comprising:

at least one antigen; and

an adjuvant composition comprising a delivery vehicle; and at least one ligand for a pattern recognition receptor molecule.

70. The composition of claim 69, further comprising said antigen and said ligand for a pattern recognition molecule receptor are complexed to said delivery vehicle.

71. The composition of claim 69, wherein the ligand for the pattern recognition molecule receptor comprises a TLR receptor ligand.

72. The composition of claim 69, wherein said antigen comprises an intact microorganism.

73. The composition of claim 72, wherein said microorganism comprises at least one organism selected from the group consisting of viral organism, bacterial organism, fungal organism, protozoan organism, parasitic pathogenic organisms, rickettsial organisms, and arthropod organisms.

74. The composition of claim 69, wherein said antigen comprises at least one molecule selected from the group consisting of a protein, a peptide, a carbohydrate, a lipoprotein; a glycopeptide, a glycoprotein, a glycolipid and a lipid.

75. The composition of claim 69, wherein said antigen is a cell.

76. The composition of claim 75, wherein said cell consist of one or more of an autologous, or an allogeneic tumor cell.

77. The composition of claim 69, wherein said delivery vehicle comprises a liposome.

78. The composition of claim 69, wherein said delivery vehicle comprises lipids selected from the group consisting of multilamellar vesicle lipids, extruded liposomes and unilamellar liposomes.

79. The composition of claim 77, wherein said liposome comprises at least one of the group consisting of a positively charged liposome, a modified multilamellar liposome, a cationic liposome, a neutral liposome and a negatively charged liposome.

80. The composition of claim 69, wherein said delivery vehicle comprises at least one pair of lipids selected from the group consisting of DOTMA and cholesterol; DOTAP and cholesterol; DOTIM and cholesterol; DDAB and cholesterol.

81. The composition of claim 69, wherein said delivery vehicle comprises a non-liposomal delivery vehicle.

82. The composition of claim 81, wherein the delivery vehicle comprises at least one vehicle selected from the group consisting of polypeptides, polyamines, chitosan, PEI, polyglutamic acid, protamine sulfate and triclosan.

83. A method for vaccinating comprising:

administering to a subject a composition of an antigen; and
an adjuvant composition including a delivery vehicle; and

a TLR ligand to a subject.

84. The method of claim 83, further comprising said antigen and said TLR ligand complexed to said delivery vehicle.

85. The method of claim 83, further comprising administering said composition by a route selected from the group consisting of: intravenously, intraperitoneally, by inhalation, subcutaneously, intradermally, intranodally, intramuscularly, intranasally, orally, rectally, intravaginally, intravesicularly, intraocularly, and topically.

86. The method of claim 83, further comprising augmenting an immune response in a subject disposed of cancer.

87. The method of claim 86, wherein the cancer comprises at least one cancer selected from of the group consisting of lung cancer, skin cancer, liver cancer, bone marrow cancer, ovarian cancer, breast cancer, prostate cancer, colon cancer, lymphoma, brain cancer, renal cell cancer, and cancers of mesenchymal tissues.

88. The method of claim 83, further comprising augmenting an immune response in a subject disposed of infectious disease.

89. The method of claim 88, wherein said infectious disease comprises at least one disease selected from the group consisting of a disease due to a viral pathogen; a fungal pathogen, a bacterial pathogen, a ricketssial pathogen, a parasitic pathogen, an arthrorpod pathogen, and a prion pathogen.

90. A composition comprising:
an adjuvant composition comprising
at least one antigen,
a delivery vehicle; and
at least one ligand for a pattern recognition receptor molecule.

91. The composition of claim 90, further comprising said antigen incorporated into said delivery vehicle and then mixed with a ligand for a pattern recognition molecule receptor.

92. The composition of claim 91, wherein said ligand for a pattern recognition molecule receptor comprises a TLR ligand.

93. The composition of claim 90, wherein the delivery vehicle comprises a liposome.

94. The composition of claim 93, wherein the ratio of liposome to TLR ligand is from about 1:1 to about 100:1nmol liposome per ng TLR ligand.

95. The composition of claim 93, wherein said liposome consists of at least one molecule selected from the group consisting of a positively charged liposome, a negatively charged liposome; a cationic liposome; and a modified multilamellar liposome.

96. The composition of claim 95, wherein said cationic liposome further comprises said cationic liposomes complexed to bacterial DNA.

97. The composition of claim 90, wherein said delivery vehicle consists of a mixture of charged and neutral lipids.

98. The composition of claim 90, wherein said TLR ligand comprises any portion of a bacterium that associates with a TLR.

99. The composition of claim 90, wherein said TLR ligand comprises a bacterial cell wall component.

100. The composition of claim 90, wherein said TLR ligand binds at least one receptor selected from the group consisting of TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-10, TLR-11 and TLR-12.

101. The composition of claim 90, wherein said TLR ligand binds TLR 2, TLR 5 or TLR 9.

102. The composition of claim 90, wherein said TLR ligand comprises a flagellin protein.

103. The composition of claim 102, wherein said flagellin protein comprises the minimal portion of flagellin capable of binding and activating a TLR 5.

104. The composition of claim 90, wherein said TLR ligand comprises a nucleic acid.

105. The composition of claim 104, wherein said nucleic acid comprises at least one molecule selected from the group consisting of bacterial DNA, eukaryotic DNA, synthetic oligonucleotide, and RNA.

106. The composition of claim 105, wherein said RNA comprises at least one molecule selected from the group of double-stranded RNA, single-stranded RNA and synthetic RNA.

107. The composition of claim 90, wherein said TLR ligand comprises at least one of poly I:C and poly I:C related oligonucleotides that is capable of binding TLR3.

108. The composition of claim 90, wherein said TLR ligand comprises any portion of a fungal or a yeast organism.

109. The composition of claim 108, wherein the portion of a fungal or a yeast organism comprises any portion of a cell wall of the organism.

110. The composition of claim 90, wherein said TLR ligand comprises a mixture of two or more different TLR ligands in ratios sufficient for eliciting immune responses.

111. The composition of claim 90, wherein said TLR ligand consists of any ligand that associates with and/or stimulates a TLR.

112. A method of treating a subject with cancer comprising:

administering at least one ligand for a pattern recognition receptor and a delivery vehicle; in conjunction with at least one cancer therapy wherein said method elicits a response in a subject disposed of cancer.

113. The method of claim 112, wherein said cancer therapy comprises at least one therapy consisting of hyperthermia therapy, radiation therapy, chemotherapy, photodynamic therapy (PDT), surgery, ultrasound, and focused ultrasound.

114. The method of claim 112, wherein the order of administering the therapy generates different responses.

115. The method of claim 114, wherein radiation therapy is introduced first.

116. The method of claim 114, wherein radiation therapy is introduced last.

117. The method of claim 114, wherein radiation therapy is introduced concurrently.

118. The method of claim 112, wherein the pattern recognition receptor ligand comprises a nucleic acid molecule.

119. The method of claim 112, wherein the pattern recognition receptor ligand comprises bacterial DNA.

120. The method of claim 112, wherein the delivery vehicle comprises a liposome.

121. The method of claim 112, wherein the delivery vehicle comprises a non-liposomal delivery vehicle.

122. A method comprising:

coating a medical device with a composition comprising at least one ligand for a pattern recognition molecule receptor; and

a delivery vehicle.

123. The method of claim 122, wherein the medical device comprises an implanted device.

124. The method of claim 123 wherein the implanted device consists of at least one of the following devices consisting of a catheter, a stent, a mesh repair material, a Dacron vascular prothesis, a orthopedic metallic plate, a rod and a screws.

125. The method of claim 122, wherein the delivery device comprises a sustained release particle and a delivery vehicle.

126. The method of claim 125, wherein the delivery vehiclecomprises a liposome.

127. The method of claim 126, wherein the liposome further comprises a liposome combined with an inert matrix or sustained release biomaterial.

128. The method of claim 127, wherein the inert matrix comprises at least one material selected from the group consisting of collagen, gelatin, PLA (define) microspheres, serum clots, and organic gels.

129. A method comprising:

administering a composition comprising at least one ligand for a pattern recognition molecule receptor;

a delivery device; and

radiation therapy to a subject.

130. The method of claim 129, wherein a ligand for a pattern recognition molecule receptor comprises a ligand for a signaling pattern recognition receptor.

131. The method of claim 129, wherein a ligand for a pattern recognition molecule receptor comprises a ligand for an pattern recognition receptor.

132. The method of claim 129, further comprising augmenting an immune response in said subject.

133. The method of claim 132, wherein augmenting an immune response comprises augmenting an immune response in a subject disposed of cancer.

134. The method of claim 133, wherein cancer comprises at least one cancer selected from the group consisting of lung cancer, skin cancer, liver cancer, bone marrow cancer, brain cancer, renal cell cancer, ovarian cancer, breast cancer, prostate cancer, cancers of mesenchymal tissues, lymphoma and colon cancer.

135. The composition of claim 129, wherein the order of administering the therapy generates different responses.

136. The composition of claim 135, wherein radiation therapy is introduced first.

137. The composition of claim 135, wherein radiation therapy is introduced last.

138. The composition of claim 135, wherein radiation therapy is introduced concurrently.

139. The method of claim 129, wherein the ligand comprises a synthetic compound capable of binding a pattern recognition receptor.

140. The method of claim 139, wherein the synthetic compound comprises immadazoquinoline.

141. A kit comprising:

a delivery container;

a delivery device;

at least one ligand for a pattern recognition receptor; and

plus or minus an antigen; wherein said ligand is capable of eliciting an immune response in a subject.

142. The kit of claim 141, further comprising one or more chemotherapy agents.

143. A method comprising:

administering a composition comprising at least one ligand for a pattern recognition molecule receptor; and

a delivery vehicle to a subject wherein said composition increases bone healing.

144. The method of claim 143, wherein the composition is administered prior to a bone graft.

145. The method of claim 143, wherein the ligand is encapsulated by an extended release material.

146. A method comprising:

administering a composition comprising at least one ligand for a pattern recognition molecule receptor; and

a delivery vehicle to a subject wherein said composition is capable of relieving injury.

147. The method of claim 146, wherein the injury comprises at least one of oxidative stress injury and/or apoptotic mediated injury.

148. The method of claim 147, wherein the injury comprises mucositis, serositis, parenchymal injury, reperfusion injury, or radio and/or chemotherapy associated injury.

149. The method of claim 146, wherein the composition further initiates an innate immune response.

150. The method of claim 146, wherein the composition is administered to a subject of advanced age.